

A circular stamp with a double-line border. The outer ring contains the text "U.S. PATENT & TRADEMARK OFFICE" in a clockwise direction. The inner circle is divided into two sections: the upper section contains "SEP 10 2002" and the lower section contains "JC15".

CLAIMS

34. A biomedical biocompatible polyurethane based on (i) a diisocyanate linked polyester polymer component and (ii) a diol component, said diol component having a uniform block-length, the polymer being biodegradable.

1 35. The biomedical biocompatible polyurethane according to
2 claim 34, having the formula:

$$+ A - B - C - B \rangle_n$$

6 wherein the term B denotes a diisocyanate moiety, the term
7 A denotes a polyester moiety, the term C denotes a diol
8 moiety and n is the number of recurring units.

1 36. A biomedical biocompatible polyurethane according to
2 claim 34 consisting of repeating units of the following
3 formula:

$$\left\{ C(O) - NH - R_1 - NH - C(O) - O - D - O - C(O) - NH - R_1 - NH - C(O) - O - E - O \right\},$$

7 wherein R₁ is an n-butylene moiety, D is a polyester
8 moiety, E is selected from the group consisting of an
9 ethylene glycol-based moiety, an n-butylene glycol-based
10 moiety, an n-hexylene glycol-based moiety and a diethylene
11 glycol-based moiety and n indicates the number of repeating
12 units.

1 37. A biomedical biocompatible polyurethane according to
2 claim 36, wherein E is selected from the group consisting
3 of ethylene, n-butylene, n-hexylene, -CH₂-CH₂-O- CH₂-CH₂-
4 and -XYX-, wherein X is selected from the group consisting
5 of an ethylene glycol-based moiety, an n-butylene
6 glycol-based moiety, an n-hexylene glycol-based moiety and
7 a diethylene glycol-based moiety and Y is a 1,4 butane
8 diisocyanate-based moiety resulting from the reaction of
9 1,4 butane diisocyanate with a diol selected from the group
10 consisting of ethylene glycol, n-butylene glycol,
11 n-hexylene glycol and diethylene glycol, with the mole
12 ratio of glycol:diisocyanate being 2:1.

1 38. A biomedical biocompatible polyurethane according to
2 claim 34, wherein the block-length is the same for at
3 least 90% of the diol units.

1 39. A biomedical biocompatible polyurethane according to
2 claim 34, wherein the polyester is based on a polyester
3 prepared by ring opening polymerization.

1 40. A biomedical biocompatible polyurethane according to
2 claim 39, wherein the polyester is a random copolyester and
3 is a copolyester having at least two of a moiety selected
4 from the group consisting of lactide, glycolide,
5 trimethylene carbonate and ε-caprolactone.

1 41. A biomedical biocompatible polyurethane according to
2 claim 34, wherein the polyester is based on (i) at least
3 one carboxylic acid selected from the group consisting of
4 lactic acid and succinic acid and (ii) at least one diol

5 selected from the group consisting of ethylene glycol,
6 1,4 butanediol, 1,6 hexanediol and diethylene glycol.

1 42. A biomedical biocompatible polyurethane according to
2 claim 34 produced according to a process comprising the
3 steps of (i) reacting the polyester with an isocyanate
4 end-capped diol component in order to form a prepolymer,
5 the ratio of isocyanate end-groups to polyester end-groups
6 being at least 2:1, and then (ii) reacting the resulting
7 prepolymer with water.

1 43. A biomedical biocompatible polyurethane according to
2 claim 42, based on a copolyester of lactide and
3 ϵ -caprolactone containing 5 to 95% of units of lactide and 5
4 to 95% of units of ϵ -caprolactone, based on number.

1 44. A reaction product having the formula -XYX- and having
2 a uniform block-length produced according to the process
3 comprising the step of reacting a diol selected from the
4 group consisting of 1,6-hexane diol and diethyleneglycol
5 with 1,4 butane diisocyanate wherein the mole ratio of
6 diol:diisocyanate is 2:1 and wherein X is the diol-based
7 component and Y is the 1,4 butane diisocyanate-based
8 component.

1 45. A process for the preparation of a biomedical
2 biocompatible polyurethane defined according to claim 34,
3 comprising the steps of (i) reacting at least 2 moles of a
4 diisocyanate with 1 mole of a polyester to form a first
5 reaction product and (ii) reacting a diol selected from the

6 group consisting of 1,4 butanediol, 1,6 hexane diol and
7 diethyleneglycol with said first reaction product.

1 46. A process for the preparation of a biomedical
2 biocompatible polyurethane defined according to claim 34
3 comprising the steps of (i) reacting at least two moles of
4 a diisocyanate with one mole of a diol selected from the
• 5 group consisting of 1,4 butanediol, 1,6 hexane diol and
6 diethyleneglycol to form a first reaction product and
7 (ii) reacting a polyester which is a random copolymer with
8 said first reaction product.

1 47. An implant constructed from at least one biomedical
2 biocompatible polyurethane defined according to claim 34,
3 having a porosity of 50 to 99 vol.%.

1 48. A method for reconstruction of at least one meniscal
2 lesion comprising the step of effecting an adhesive implant
3 to meniscal tissue having at least one of said lesions of a
4 meniscus-reconstructing quantity at a
5 meniscus-reconstructing rate of at least one polyurethane
6 defined according to claim 34 for a fibrocartilage
7 induction time of from 10 up to 30 weeks.

1 49. A biomedical biocompatible polyurethane having a phase
2 separated morphology, comprising (i) soft segments selected
3 from the group consisting of (a) polyester components,
4 (b) polyether components and (c) polyester-polyether
5 components and (ii) hard segments, said hard segments
6 consisting of diol components having a uniform
7 block-length, and wherein (A) the diol component and (B) at

8 least one of the polyester, the polyether or the
9 polyester-polyether components have been linked to a
10 diisocyanate component by means of reaction thereof with a
11 diisocyanate.

1 50. A biomedical biocompatible polyurethane according to
2 claim 38, wherein the block-length is the same for at
3 least 98% of the diol units.

1 51. A biomedical biocompatible polyurethane according to
2 claim 39, wherein the polyester is based on a random
3 copolyester.

1 52. A biomedical biocompatible polyurethane according to
2 claim 43, comprising from 40 up to 60% of units of lactide,
3 based on number.

1 53. A biomedical biocompatible polyurethane according to
2 claim 43, comprising from 40 up to 60% of units of
3 ε-caprolactone, based on number.

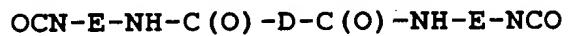
1 54. A biomedical biocompatible polyurethane according to
2 claim 49, wherein the diisocyanate is an aliphatic
3 diisocyanate.

1 55. A biomedical biocompatible polyurethane according to
2 claim 34 wherein the diisocyanate-linked polyester
3 component is a 1,4 butane diisocyanate-linked polyester
4 component.

1 56. A reaction product having a formula selected from the
2 group consisting of YXY and YXYXY and having a uniform
3 block length produced according to a process comprising the
4 steps of reacting a diol selected from the group consisting
5 of 1,4 butanediol, 1,6 hexanediol, diethylene glycol and
6 ethylene glycol with 1,4 butane diisocyanate wherein X is
7 the diol-based component and Y is the 1,4 butane
8 diisocyanate-based component.

1 57. A biomedical biocompatible polyurethane according to
2 claim 36, wherein E is an -YXY- or -YXYXY- reaction product
3 component of diol (X) and 1,4 butane diisocyanate (Y).

1 58. A pre-polymer having the structure:



2 wherein D is a polyester component and E is selected from
3 the group consisting of ethylene, n-butylene, n-hexylene,
4 -CH₂-CH₂-O-CH₂-CH₂- and -XYX-, wherein X is selected from
5 the group consisting of an ethylene glycol-based moiety,
6 an n-butylene glycol-based moiety, an n-hexylene
7 glycol-based moiety and a diethylene glycol-based moiety
8 and Y is a 1,4 butane diisocyanate-based moiety resulting
9 from the reaction of 1,4 butane diisocyanate with a diol
10 selected from the group consisting of ethylene glycol,
11 n-butylene glycol, n-hexylene glycol and diethylene glycol.

1 59. A process for preparing a urethane polymer comprising
2 the steps of:

3 i. admixing equimolar quantities of L-lactide and
4 ε-caprolactone in the presence of a stannous octoate

5 catalyst and a butanediol initiator thereby forming an
6 L-lactide- ε-caprolactone prepolymer;
7 ii. admixing butanediol with a six-fold excess of butane
8 diisocyanate thereby forming an isocyanate-terminated
9 urethane block;
10 iii. dissolving the L-lactide- ε-caprolactone prepolymer in
11 dimethyl sulfoxide to form a first solution;
12 iv. dissolving the isocyanate-terminated block in dimethyl
13 sulfoxide to form a second solution;
14 v. admixing the first solution with the second solution
15 to form a polyurethane reaction mass;
16 vi. recovering the resulting urethane polymer from the
17 reaction mass.

1 60. A process for preparing a urethane polymer comprising
2 the steps of:
3 i. admixing equimolar quantities of L-lactide and
4 ε-caprolactone in the presence of a stannous octoate
5 catalyst and a butanediol initiator thereby forming a
6 L-lactide- ε-caprolactone prepolymer;
7 ii. admixing butane diisocyanate with a six-fold excess of
8 butanediol thereby forming an hydroxyl-terminated
9 urethane block;
10 iii. dissolving the L-lactide- ε-caprolactone prepolymer in
11 dimethyl sulfoxide to form a first solution;
12 iv. dissolving the hydroxyl-terminated block in dimethyl
13 sulfoxide to form a second solution;
14 v. admixing the first solution with the second solution
15 to form a polyurethane reaction mass;

16 recovering the resulting urethane polymer from the reaction
17 mass.

(plclaims/ks/109)